

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Canceled)

2. (Canceled)

3. (Currently Amended) A mobile radio communication apparatus ~~according to claim 1,~~ applicable to a plurality of radio communication systems, comprising:

a wireless transmitter-receiver device configured to perform transmission/reception of a radio signal;

a signal processing device including a resource to which functions are defined, wherein the resource handles at least a modem function and a protocol function, and configured to perform a signal processing necessary in the transmission/reception by use of the resource; and

a controller which controls said signal processing device to redefine, to the resource, another modem function and another protocol function corresponding to respective one of the mobile communication systems;

wherein said signal processing device comprises:

at least one programmable hardware device serving as a part of said resource and including a circuit structure capable of being redefined according to a set of a plurality of logic circuits which carry out basic calculations of at least a part of said signal processing; and

a general-use processor serving as another part of said resource and configured to carry out at least another part of said signal processing by executing a predetermined program; and

said controller determines respective shares of processing to be executed by said programmable hardware device and the general-use processor in accordance with the contents of said signal processing and controls said signal processing device to define, to the resource, the signal processing functions in accordance with determination of the share.

4. (Currently Amended) A mobile radio communication apparatus ~~according to claim 1~~, applicable to a plurality of radio communication systems, comprising:

a wireless transmitter-receiver device configured to perform transmission/reception of a radio signal;

a signal processing device including a resource to which functions are defined, wherein the resource handles at least a modem function and a protocol function, and configured to perform a signal processing necessary in the transmission/reception by use of the resource; and

a controller which controls said signal processing device to redefine, to the resource, another modem function and another protocol function corresponding to respective one of the mobile communication systems;

wherein said signal processing device comprises:

at least one programmable hardware device serving as at least a part of said resource and including a circuit structure capable of being redefined according to a set of a plurality of logic circuits which carry out basic calculations of at least a part of said signal processing;

a first memory which stores a program indicating a procedure of said signal processing;

a second memory which stores a plurality of circuit structure descriptions of said programmable hardware device corresponding to processing contents respectively, the circuit structure descriptions being used for said signal processing device to carry out said signal processing; and

a program sequencer configured to control the programmable hardware device and said second memory to revise the circuit structure descriptions of said programmable hardware device in accordance with the program read out from said first memory under a control of said controller.

5. (Currently Amended) A mobile radio communication apparatus ~~according to claim 4,~~ applicable to a plurality of radio communication systems, comprising:

a wireless transmitter-receiver device configured to perform transmission/reception of a radio signal;

a signal processing device including a resource to which functions are defined, wherein the resource handles at least a modem function and a protocol function, and configured to perform a signal processing necessary in the transmission/reception by use of the resource; and

a controller which controls said signal processing device to redefine, to the resource, another modem function and another protocol function corresponding to respective one of the mobile communication systems;

wherein said signal processing device further comprises

at least one programmable hardware device serving as at least a part of said resource and including a circuit structure capable of being redefined according to a set of a plurality of logic circuits which carry out basic calculations of at least a part of said signal processing;

a first memory which stores a program indicating a procedure of said signal processing;

a second memory which stores a plurality of circuit structure descriptions of said programmable hardware device corresponding to processing contents respectively, the circuit structure descriptions being used for said signal processing device to carry out said signal processing;

a program sequencer configured to control the programmable hardware device and said second memory to revise the circuit structure descriptions of said programmable hardware device in accordance with the program read out from said first memory under a control of said controller; and

a general-use processor serving as another part of said resource and configured to carry out at least another part of said signal processing by executing a given program; and said program sequencer determines respective shares of processing to be executed by said programmable hardware device and the general-use processor in accordance with the program read out from said first memory, selects one of said plurality of circuit structure descriptions stored in said second memory in accordance with determination of the shares and supplies selected description to said programmable hardware device, and gives an execution instruction of the processing to be shared by said general-use processor to said general-use processor.

6. (Canceled)

7. (Currently Amended) A mobile radio communication apparatus according to claim [[6]] 29, wherein said controller acquires structure description information indicating a structure of said newly requested signal processing function provided from an outside of said

radio communication apparatus, and controls said signal processing device to define, to the resource, the newly required signal processing function in accordance with a resource amount necessary for defining the newly required signal processing function of the resource and an excessive the residual resource amount, with use of the acquired structure description information.

8. (Currently Amended) A mobile radio communication apparatus ~~according to claim 6,~~ applicable to a plurality of radio communication systems, comprising:

a wireless transmitter-receiver device configured to perform transmission/reception of a radio signal;

a signal processing device including a resource to which signal functions are defined, and configured to perform a signal processing necessary in the transmission/reception by use of the resource; and

a controller which controls said signal processing device to redefine, to the resource, a newly required signal processing function in accordance with a resource amount necessary for redefining the newly required signal processing function of the resource and a residual resource amount;

wherein

(a) said controller acquires structure description information provided from outside of said radio communication apparatus via said wireless transmitter-receiver device, the structure description information indicating a structure of said newly requested signal processing function;

(b) said controller obtains a resource amount necessary for defining, to the resource, the newly required signal processing function of the resource with use of the acquired structure description information;

(c) said controller compares said resource amount obtained and an initial resource amount preset in said signal processing device with each other;

(d) said controller grasps said ~~excessive source~~ residual resource amount when the obtained resource amount is smaller than the initial resource amount;

(e) said controller determines if it is possible to additionally define said newly requested signal processing function to said resource by comparing the grasped ~~excessive~~ residual resource amount with the obtained resource amount necessary for defining, to the resource, the newly required signal processing function of the resource; and

(f) said controller executes an additional definition when it is determined that the additional definition can be done.

9. (Original) A wireless system comprising:

the mobile radio communication apparatus according to claim 7; and

an information providing apparatus configured to provide the structure description information to said controller of said mobile radio communication apparatus.

10. (Original) A wireless system according to claim 9, characterized in that said information providing apparatus is installed in a base station which carries out radio communications with said mobile radio communication apparatus.

11. (Currently Amended) A wireless system ~~according to claim 9, comprising:~~

the mobile radio communication apparatus according to claim 7; and

an information providing apparatus configured to provide the structure description information to said controller of said mobile radio communication apparatus;

wherein said wireless transmitter-receiver device is configured to perform transmission/reception of a radio signal with said information providing apparatus; and said information providing apparatus comprises:

an another wireless transmitter-receiver device configured to perform transmission/reception of a radio signal with said mobile radio communication apparatus; and an another controller configured to control said another wireless transmitter-receiver device to provide the controller with information for defining, to the resource, the newly required signal processing function in accordance with the resource amount and the excessive residual resource amount, the resource amount and excessive residual resource amount being grasped based on information acquired by the another controller and containing a use status of said resource.

12. (Canceled)

13. (Canceled)

14. (Canceled)

15. (Canceled)

16. (Canceled)

17. (Canceled)

18. (Canceled)

19. (Canceled)

20. (Currently Amended) A mobile radio communication apparatus ~~according to~~
~~claim 16, applicable to a plurality of radio communication systems, comprising:~~

a wireless transmitter-receiver device configured to perform transmission/reception of
a radio signal;

a signal processing device including a resource to which signal functions are defined
based on a predetermined software module, and configured to perform a signal processing
necessary in the transmission/reception by use of the resource;

a storage device configured to store a plurality of software modules respectively
corresponding to a plurality of signal processing functions executed by said signal processing
device, and a table which records at least a use log of each of said plurality of software
modules; and

a controller which controls said signal processing device and said storage device to
read out at least one software module corresponding to a signal processing function to be
executed by said signal processing device from said storage device, to assign the read-out
software module to said signal processing device, and to rewrite at least one of the software
modules stored in said storage device with reference to the table;

wherein said storage device stores a version of each of said plurality of software
modules in the table as a use log of each of the software modules; and

said controller controls said storage device to compare a version of at least one
software module corresponding to a signal processing function to be executed by said signal
processing device with the versions of the software modules stored in said storage device
with reference to the table, and when the versions of these software modules are equal to each

other, said controller reads the software modules from said storage device and assigns the read-out modules to said signal processing device.

21. (Currently Amended) A mobile radio communication apparatus ~~according to claim 20~~, applicable to a plurality of radio communication systems, comprising:

a wireless transmitter-receiver device configured to perform transmission/reception of a radio signal;

a signal processing device including a resource to which signal functions are defined based on a predetermined software module, and configured to perform a signal processing necessary in the transmission/reception by use of the resource;

a storage device configured to store a plurality of software modules respectively corresponding to a plurality of signal processing functions executed by said signal processing device, and a table which records at least a use log of each of said plurality of software modules; and

a controller which controls said signal processing device and said storage device to read out at least one software module corresponding to a signal processing function to be executed by said signal processing device from said storage device, to assign the read-out software module to said signal processing device, and to rewrite at least one of the software modules stored in said storage device with reference to the table;

wherein said storage device stores a version of each of said plurality of software modules in the table as a use log of each of the software modules; and

said controller controls said storage device to compare a version of at least one software module corresponding to a signal processing function to be executed by said signal processing device with the versions of the software modules stored in said storage device with reference to the table, and when the versions of these software modules are equal to each

other, said controller reads the software modules from said storage device and assigns the read-out modules to said signal processing device;

wherein said controller further comprises a download buffer configured to buffer at least one software module downloaded from outside, and controls said signal processing device to download at least one software module corresponding to a signal processing function to be executed by said signal processing device when the versions of these software modules are not equal to each other, to buffer it to said download buffer and assign the buffered module to said signal processing device.

22. (Canceled)

23. (Canceled)

24. (Currently Amended) A mobile radio communication apparatus ~~according to claim 22,~~ applicable to a plurality of radio communication systems, comprising:

a wireless transmitter-receiver device configured to perform transmission/reception of a radio signal;

a signal processing device including a resource to which signal functions are defined based on a predetermined software module, and configured to perform a signal processing necessary in the transmission/reception by use of the resource;

a storage device configured to store a plurality of software modules respectively corresponding to a plurality of signal processing functions executable by said signal processing device in correspondence with the radio communication systems, a plurality of first data files each having a file format corresponding to unique application software

prepared for each of the radio communication systems, and a second data file having a common file format;

a first converter device configured to execute conversion of at least one of said plurality of first data files stored in said storage device into the second data file, and newly store the second data file in said storage device;

a second converter device configured to execute conversion of at least one of said plurality of second data files stored in said storage device into at least one first data file; and

a controller configured to control said signal processing device and said storage device to read out a software module corresponding to a predetermined one of the radio communication systems from said storage device and to assign the read-out software module to said signal processing device

wherein said second converter device converts at least one of the second data files stored in said storage device into a first data file having a file format corresponding to unique application software prepared for said predetermined one mobile communication system, when said controller reads out the software module corresponding to said predetermined one of the radio communication systems from said storage device and assigns the read-out software module to said signal processing device.

25. (Canceled)

26. (Canceled)

27. (Canceled)

28. (Canceled)

29. (New) A mobile radio communication apparatus applicable to a plurality of radio communication systems, comprising:

a wireless transmitter-receiver device configured to perform transmission/reception of a radio signal;

a signal processing device including a resource to which signal functions are defined, and configured to perform a signal processing necessary in the transmission/reception by use of the resource; and

a controller which controls said signal processing device to redefine, to the resource, a newly required signal processing function in accordance with a resource amount necessary for redefining the newly required signal processing function of the resource and a residual resource amount of the resource,

wherein said controller determines if it is possible to additionally define said newly requested signal processing function to said resource by comparing the residual resource amount with the resource amount necessary for defining, to the resource, the newly required signal processing function of the resource, and executes an additional definition when it is determined that the additional definition can be done.